Culture and Medicine

The practice of clinical medicine as an art and as a science

John Saunders
Nevill Hall Hospital
Department of Medicine
Abergavenny, Gwent,
NP7 7AG
UK
saundersjohn@doctors.org.uk

Competing interests: None declared

This article was published in *J Med Ethics: Medical Humanities* 2000;26:18-22

"Medicine in industrialised countries is scientific medicine," write Glymour and Stalker.[1] The claim tacitly made by US or European physicians and tacitly relied on by their patients is that their palliatives and procedures have been shown by science to be effective. Although physicians' medical practice is not itself science, it is based on science and on training that is supposed to teach physicians to apply scientific knowledge to people in a rational way. This distinction between understanding nature and power over nature, between pure and applied science, was first made by Francis Bacon in his *Novum Organum* of 1620.[2(p28)] Medicine as practiced today is applied science. Thomas Huxley pointed out in his address at the opening of Mason's College in Birmingham, England, in 1880 that applied science is nothing but the application of pure science to particular classes of problems.[3] No one can safely make these deductions unless he or she has a firm grasp of the principles. Yet, the idea of the practice of clinical medicine as an art persists. What is this? Does it amount to anything more than romantic rhetoric—a nod in the direction of humanitarianism? Is this what the author of a guide to the membership examination of the Royal College of Physicians referred to as late as 1975 when a guide stated that its membership examination "remains partly a test of culture, although knowledge of Latin, Greek, French, and German is no longer required"?[4]

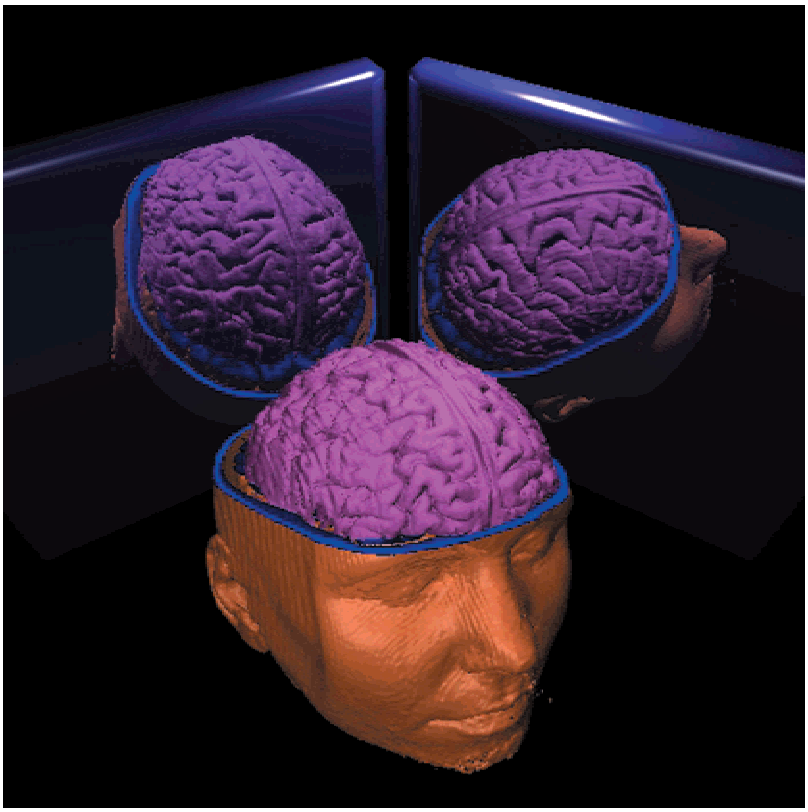
Like many large textbooks, *Cecil Textbook of Medicine* begins with a discourse on medicine as an art.[5] Its focus is the patient, defined as a fellow human seeking help because of a problem relating to his or her health. From this emerges the comment that for medicine as an art, its chief and characteristic instrument must be human faculty. What aspects of the faculty matter? We are offered the ability to listen, to empathize, to inform, to maintain solidarity—for the physician, in fact, to be part of the treatment. No one would want to dispute the desirability of these properties, but they describe, first, moral dimensions to care—we listen because of respect for persons and so on—and second, skills. Interpersonal skills may be frequently lacking, just as technical skills may be. But they can, at least in principle, be observed, taught, tested, and their value assessed, just like any practical technical skill.

We could probably say much the same about the third part of the mantra of medical teachers: attitudes. Whereas these may be more dependent on physicians' upbringing and personalities, attitudes can be changed with education or appropriate legislation, can be observed and scored, and can be evaluated in their contribution to patient care or diagnostic technique—at least in principle and even if these are crudely done. Part of the art of clinical medicine may lie in these areas, but not exclusively so: the art is not just practical performance. I want to suggest that the art and science of medicine are inseparable, part of a common culture. Knowing is an art; science requires personal participation in knowledge.

Intellectual problems have an impersonal, objective character in that they can be conceived of as existing relatively independently of the particular thought, experiences, aims, and actions of individual people. Without such an impersonal, objective character, the practice of medicine would be impossible. Medical practice depends on generalizations that can be reliably applied and scientifically demonstrated. Without understanding people as objects in this way, there can be no such thing as medical science."[1] In the accumulation of such knowledge, physicians—like engineers—share experiences individually through meetings and publications. Within the community of its discipline, this intersubjectivity establishes the objectivity of science: it is knowledge that can be publicly tested. This approach can be summed up as a doctrine of standard empiricism in which the specific aim of inquiry is to produce objective knowledge and truth—and to provide explanations and understanding. Science as pure science is knowledge of the natural environment for its own sake, or rather, for understanding. Science as applied science or technology is the exercise of a working control over it. Such is medicine. In its methods, scientific thinking should—must—be insulated from all kinds of psychologic, sociologic, economic, political, moral, and ideologic factors that tend to influence thought in life and society. Without those proscriptions, objective knowledge of truth degenerates into prejudice and ideology.

VALUE-NEUTRAL TRUTH

Although the aim of standard empiricism is value-neutral truth, that does not imply that science is insulated from outside factors. It merely states that such factors are not integral to it—social context, for example. Physicians (and other health care professionals) are, of course, enmeshed in the obligations and responsibilities of their profession. Such responsibilities may extend from the patient, to the health care system, or to society as a whole. Their role as technologically trained practitioners according to the canons of standard empiricism does not exclude their adopting other roles—as a consoler or healer, for example. There is no logical bar to combining several roles, nor does standard empiricism form any logical bar to caring, em-



Volvis

Medical practice merges art and science

pathy, compassion, "moderated love," or simply, personal medicine. Nevertheless, we might consider what happens in practice.

In an entertaining but enlightening editorial, Anthony Clare points out that many physicians like to bask in the reflected glory of medicine as a scientific undertaking that transcends national barriers.[6] The international pharmaceutical industry, the vast number of international academic meetings, the ever-increasing number of international specialist societies, and even the World Health Organization itself are all evidence of this. Nevertheless, much clinical practice is still heavily influenced by national culture and character. Clare gives examples. Take the French disease, "spasmophilia," a condition whose incidence increased 7-fold in the 1970s and, he tells us, is diagnosed on the basis of an abnormal Chvostek sign and oddities on the electromyogram. In the United States, if it exists at all, it is "panic disorder." In Britain, it does not exist, so presumably sufferers in France might be cured by a trip on Eurostar. The Germans consume 6 times as many heart drugs as their British counterparts, with cardiac glycosides being the second-most-prescribed group of drugs after non-narcotic analgesics. One electrocardiographic survey of supposedly healthy citizens of Hamburg showed a rate of abnormalities of 40%. Germans have 85 drugs listed for the treatment of low blood pressure and annual consultation rates of 163 per million. Hardly anyone in Britain gets treated for low blood pressure. Physicians in the United States think treating low blood pressure amounts to malpractice.

Fashion is another powerful influence.[7] There are treatments of fashion, investigations of fashion, diseases of fashion, and operations of fashion. Hypoglycemia comes and goes; chronic mononucleosis is probably on the way out, as is ME, even if chronic fatigue syndrome survives. Mitral leaflet prolapse syndrome caught our fancy in the 1970s when everyone who had an echocardiogram had it; then we've had temporomandibular joint syndrome, post-traumatic stress syndromes, osteoporosis, fibromyositis, candidiasis, hypersensitivity syndrome, total allergy syndrome, Gulf War syndrome, repetitive strain injury—and so they go on, a disease of fashion almost every month. One could make similar comments on treatment or investigations. The point is not simply whether they "exist," although this is controversial in many of the examples given: it is the importance that they are accorded in a supposedly objective applied science. Is this evaluation the art of clinical practice?

BAD SCIENCE

Now this, one may object, is unfair. Surely, it does not demonstrate any admirable art in medicine, merely bad science or inadequate science or no science. It is science based on poor evidence, insufficient evidence, or dogmas without evidence. Its practice is bad medicine, pressured by the degree to which disease is the sustenance of television dramas, magazine articles, commercial ads, the food industry, the publishing industry, sport, and even the weather forecast.[8] Is it not another example of the "fact" that 85% of medical procedures are unproven—a figure, or something like it, that is widely quoted, poorly defined, based on abysmal evidence, and almost certainly wrong—but very fashionable in certain circles. Aren't more and better clinical trials—the gold standard on which to base practice—what we need?

The controlled, randomized clinical trial has been a powerful instrument in furthering medical knowledge, and, of course, a physician should know its results. But it is often not enough in recommending treatment for a particular patient. The double-blind, randomized, controlled trial (RCT) is an experiment, but experiment may be unnecessary, inappropriate, impossible, or inadequate.[9] A dramatic intervention such as penicillin in meningococcal meningitis does not need a RCT to demonstrate its efficacy. An RCT would be inappropriate if the effect of random allocation reduces the effectiveness of the intervention (when active participation of the subject is required, which in turn depends on the subject's beliefs and preferences). For example, in a trial of psychotherapy, both clinicians and patients may have a preference, despite

agreeing to random allocation. As a result, the lack of any subsequent difference in outcome between the comparison groups may underestimate the benefits of the intervention. The RCT may also be inappropriate if the event is a rare one (the number of subjects will not be sufficient) or likely to take place far into the future (it cannot be continued long enough). For example, in the UK Atomic Energy Authority mortality study, 328,000 person-years' experience among radiation workers was examined.[10] This was still many times too small and yielded unsatisfactorily wide confidence intervals. In interpreting low-order risks, study situations are usually complex. In a multifactorial disease, a factor that increases the risk by less than half will almost certainly be undetectable. An RCT may be impossible if key people refuse participation or if there are ethical, legal, or political obstacles. Finally, it may be inadequate if the trial involves atypical investigators or patient groups or if patients in the RCT receive better care than they would otherwise receive, regardless of which arm they are in.

One answer to the failings of the RCT is a plea for "observational methods" (cohort and case-control studies). Black argues that the RCT provides information on the value of an intervention shorn of all context, such as patients' beliefs and wishes and clinicians' attitudes and beliefs, despite the fact that such aspects may be crucial to determining the success of the intervention.[9] By contrast, observational methods maintain the integrity of the context in which care is provided. He concludes: "There is no such thing as a perfect method; each method has its strengths and weaknesses. The two approaches should be seen as complementary."[9(p1218)]

How, then, does one balance the information from 2 different approaches? If they are complementary, what rules exist to decide to look to one method rather than the other? The answer is surely none. Good physicians use their personal judgment to affirm what they think to be true in a particular situation. Their knowledge is not purely subjective, for they cannot believe just anything, and their judgment is made responsibly and with universal intent—that is, they take it that anyone in the same position should concur. It is practical wisdom. Medical practice demands such judgments on a daily basis. The good doctor is able to reflect on diverse evidence and to apply it in a particular context. No computer could replace him or her, for the judgment cannot be reached by logic alone. Here medical practice as art and science merge.

RULES OF THUMB

At least part of the art of medicine lies in those nonscientific rules of thumb that guide decisions in practice, that enable good physicians to affirm what they believe to be true in a particular situation. These cannot be and are not science. McDonald argues that these should be discussed,

Volvis

Doctors treat patients, not x-rays. Such treatment is both a science and an art

criticized, refined, and then taught.[11] Ockham's razor tells us to go for the simplest unifying hypothesis in diagnosing a patient's disease; Sutton's law (based on the bank robber who told the judge he robbed banks because that's where the money is) tells us to go for the commonest explanation. Perhaps those 2 principles can be subsumed into the structures of science. Certainly simplicity or elegance have long been recognized as important features of science.[12] But by what rules do physicians decide to extrapolate that, for example, if it works in the old or the male, it should be used in the young or the female? Or if it works with 1 particular drug, it will also work with another drug that has the same effect. For example, the assumption is that any drug that lowers blood pressure offers benefits to a patient. Or that only a drug of the same class will have the same benefits: physicians extrapolate from evidence about 1 statin drug or 1 angiotensin-converting enzyme inhibitor to all others in the same class. Or will not extrapolate in certain other cases. Instead, physicians use the "show me" principle. Practolol was shown to reduce deaths after acute myocardial infarction,[13] but other beta blockers were not assumed to be effective until huge trials had been mounted.[14]

Or physicians treat numbers: cholesterol levels, blood glucose concentrations, and blood pressure are shown by science to benefit patients by reduction at certain extremes; noticing this, it is assumed that "more is better,"

and they lower the threshold. Or physicians assume they know more than they do. Because nothing grew on throat swabs, it was assumed that sore throats were viral, and so physicians avoided administering antibiotics. It is now known from DNA sequencing data that many identifiable bacteria were not being isolated.[15] Or physicians treat through plausible hypotheses: in the 1960s, nitrates were not used to treat angina because of the supposedly well-known phenomenon of coronary steal. Or physicians believe that tests are more discriminating than they are—for example, the claim that no pulmonary embolism could occur if the arterial oxygen tension was over 80 mm Hg.[16] Or physicians have expectations that are too great. Premarketing safety data of drugs confidently reveal acute toxic reactions occurring more often than 1 in 100 administrations. If the frequency is less than 1 in 1,000, it will take 6 months to find out. Chloramphenicol was removed as a front-line antibiotic because of 1 case of aplastic anemia in every 20,000.[17] Or expectations are too low: flu immunization, around for decades, really does work; diabetic eye examination is highly worthwhile. Or physicians' definition of disease is too narrow: thus, there is angina without pain,[18] toxic shock without shock,[19] and asthma without wheeze.[20] Or they overinvestigate and undertreat because all treatment becomes subservient to diagnosis. Or they operate on the asymptomatic with the thought that it will be worse later—forgetting that it may not be or that technical breakthrough may occur (laparoscopic surgery for gallstones, for example).

None of these processes of decision, described by McDonald, are logical or scientific in the usual sense of the words, nor are any based on evidence. Some could be, but for many, this is impossible even in principle.

UNCERTAINTY

Scientific medicine is based on evidence; but uncertainty grows when multiple technologies are combined into clinical strategies.[21] Two strategies can be used in 2 different sequences: 5 in 120. Does anyone know definitively how to treat diabetes or ischemic heart disease? There is no logical or scientific way of deciding between minimalism or an intervention based on inference and experience. Fortunately, paralytic indecisiveness is rare. Indeed, physicians become so easily confident in educated guesswork that it is easy to confuse personal opinion with evidence, or personal ignorance with genuine scientific uncertainty. It is easily forgotten that the consensus of the guideline writers is not itself "evidence" but, at best, the summary of practical wisdom. Clinical reasoning, with its reliance on experience, extrapolation, and the critical application of the other ad hoc rules described, must be applied to traverse the gray zones of practice. As Naylor says, the prudent application of evaluative sciences will affirm rather than obviate the need for the art of medicine.[21]

Eliciting patient preferences is especially important when the best course of action is in doubt. This is difficult with long-term treatments when a patient's preferences may change as time passes, but when decisions are needed now. A reflective practitioner treating hypertension or diabetes can hardly fail to be aware of this in daily practice. In conditions such as these, the trade-offs between probable short-term harms or inconveniences and possible long-term benefits are individual, difficult to quantify, full of uncertainty, and likely to change with life's changing circumstances.

No matter to what extent information is provided, physicians decide its nature, and by that advice almost always influence, and often determine, the outcome. As Theodore Fox said, "the patient may be safer with a physician who is naturally wise than with one who is artificially learned."[22] At its best, the apprenticeship system of teaching at the bedside has traditionally given British graduates at least some insights into these arts, something of quality that is both important and impossible to measure, like so many really important things. Polanyi pointed out in 1958 that "while the articulate contents of science are successfully taught all over the world in hundreds of new universities, the unspecifiable art of scientific research has not yet penetrated to many of these."[23(p53)] A master is followed because he or she is trusted even when you cannot analyze and account in detail for this. The apprentice picks up the rules of the art, including those that are not explicitly known to the master. All the efforts of microscopy and chemistry, mathematics and electronics, have failed to reproduce a single violin of the kind that the half-literate Stradivarius turned out routinely more than 200 years ago. "Denigration of value judgment is one of the devices by which the scientific establishment maintains its misconceptions."[24(p66)] Judgment and its bedfellow wisdom are concerned with adding weight to the imponderable and with adding values to the unmeasurable or unmeasured.

In a recent article, Epstein offers this example.[25] A 42-year-old mother of 2 small girls, despondent over job difficulties, was contemplating genetic screening for breast cancer as she approached the age at which her mother was diagnosed as having the same disease. Aside from the difficulties in taking an evidence-based approach to assigning quantitative risks and benefits to the genetic screening procedure (How much should I trust the available information?) and uncertainty about the effectiveness of medical or surgical interventions (Would knowing the results make a difference and, if so, to whom?), the case raised important relationship-centered questions about values (What risks are worth taking?), the patient-doctor relationship (What approach would be most helpful to the patient?), pragmatics (Is the geneticist competent and respectful?), and capacity (To what extent is the patient's

desire for testing biased by her fears, depression, or incomplete understanding of the illness and test?). In this situation, book knowledge and clinical experience alone are insufficient. Rather, there is reliance on personal knowledge of the patient (Is she responding to this situation in a way concordant with her previous actions and values?) and the physician (What values and biases affect the way I frame this situation for myself and for the patient?) to help us arrive at a mutual decision. The reflective activities applied equally to the technical aspects of medicine (How do I know I can trust the interpretations of medical tests?) and the affective domain (How well can I tolerate uncertainty and risk?). An attitude of critical curiosity, openness, and connection allowed the patient and physician to defer the decision and reconsider testing once the immediate crises had passed.

It has been said that "we don't see things as they are, we see things as we are."[26] Evidence-based medicine and the doctrines of standard empiricism offer a structure for analyzing medical decision making but are not sufficient to describe the more tacit processes of expert clinical judgment. All data, regardless of their completeness or accuracy, are interpreted by the clinician to make sense of them and apply them to clinical practice. Experts take into account messy details, such as context, cost, convenience, and the values of the patient. "Doctor factors" such as emotions, bias, prejudice, risk-aversion, tolerance of uncertainty, and personal knowledge of the patient also influence clinical judgment. The practice of clinical medicine with its daily judgments is both science and art. It is impossible to make explicit all aspects of professional competence. Evidence-based decision models may be powerful, but they are like computer-generated symphonies in the style of Mozart—correct but lifeless. The art of caring for patients, then, should flourish not merely in the theoretic or abstract gray zones where scientific evidence is incomplete or conflicting but also in the recognition that what is black and white in the abstract often becomes gray in practice, as clinicians seek to meet their patients' needs. In the practice of clinical medicine, the art is not merely part of the "medical humanities" but is integral to medicine as an applied science.

Author: John Saunders is consultant physician at Nevill Hall Hospital, Abergavenny.

References

1 Glymour C, Stalker D. Engineers, cranks, physicians, magicians. *N Engl J Med* 1983;308:960-964.
2 Medawar P. Two conceptions of science. In: *Plato's Republic.* Oxford: Oxford University Press; 1984.
3 Huxley T. Science and culture. In: Gardner M. *The Sacred Beetle.* Oxford: Oxford University Press; 1985.
4 Constable T. A guide to preparing for the MRCP(UK) exam. *Hosp Update* 1975;1:635-641.
5 Wyngaarden JB, Smith LH Jr. *Cecil Textbook of Medicine.* 18th ed. Philadelphia: WB Saunders; 1988.
6 Clare A. National variations in medical practice [editorial]. *BMJ* 1989;298:1334.
7 Burnum JF. Medical practice a la mode: how medical fashions determine medical care. *N Engl J Med* 1987;317:1220-1222.
8 Thomas L. Notes of a biology-watcher: the health-care system. *N Engl J Med* 1975;293:1245-1246.
9 Black N. Why we need observational studies to evaluate the effectiveness of health care. *BMJ* 1996;312:1215-1218.
10 Rose G. Environmental factors and disease: the man made environment. *BMJ* 1987;294:963-965.
11 McDonald CJ. Medical heuristics: the silent adjudicators of clinical practice. *Ann Intern Med* 1996;124:56-62.
12 Losee J. *A Historical Introduction to the Philosophy of Science.* Oxford: Oxford University Press; 1979.
13 Green KG, Chamberlain JA, Fulton RM, Hamer NA, Oliver MF, Pentecost BL. Improvement in prognosis of myocardial infarction by long-term beta-adrenoceptor blockade using practolol: a multicentre international study. *BMJ* 1975;3:735-740.
14 Yusuf S, Peto R, Lewis J, Collins R, Sleight P. Beta blockade during and after myocardial infarction: an overview of the randomized trials. *Prog Cardiovasc Dis* 1985;27:335-371.
15 Pace NR, Angert ER, DeLong EF, Schmidt TM, Wickham JS. New perspectives on the natural microbial world. In: Baltz RH, Hegeman GD, Skatrud PL, eds. *Industrial Microorganisms: Basic and Applied Molecular Genetics.* Washington, DC: American Society for Microbiology Press; 1993.
16 Dantzker DR, Bower JA. Alterations in gas exchange following pulmonary thromboembolism. *Chest* 1982;81:495-501.
17 Reynolds JEF. *Martindale: the Extra Pharmacopoea.* 31st ed. London: Royal Pharmaceutical Society; 1996
18 Maseri A. Coronary vasoconstriction: visible and invisible [editorial]. *N Engl J Med* 1991;325:1579-1580.
19 Tofte RW, Williams DN. Toxic shock syndrome: evidence of a broad clinical spectrum. *JAMA* 1981;246:2163-2167.
20 Johnson D, Osborn LM. Cough variant asthma: a review of the clinical literature. *J Asthma* 1991;28:85-90.
21 Naylor CD. Grey zones of clinical practice: some limits to evidence-based medicine. *Lancet* 1995;345:840-842.
22 Fox TF. The personal doctor. *Lancet* 1960;1:743-760.
23 Polanyi M. *Personal Knowledge: Towards a Post-Critical Philosophy.* London: Routledge & Kegan Paul; 1958.
24 McCormick J. Death of the personal doctor. *Lancet* 1996;348:667-668.
25 Epstein RM. Mindful practice. *JAMA* 1999;282:833-839.
26 Nin A. *The Diary of Anais Nin, 1939-1944.* New York: Harcourt Brace & World; 1969.

We welcome articles up to 600 words on topics such as a memorable patient, a paper that changed your practice, your most unfortunate mistake, or any other piece conveying instruction, pathos, or humor. The article should be supplied on disc and/or emailed to wjm@ewjm.com. Permission is needed from the patient or a relative if an identifiable patient is mentioned. We also welcome quotations of up to 80 words from any source, ancient or modern, that you have enjoyed reading.